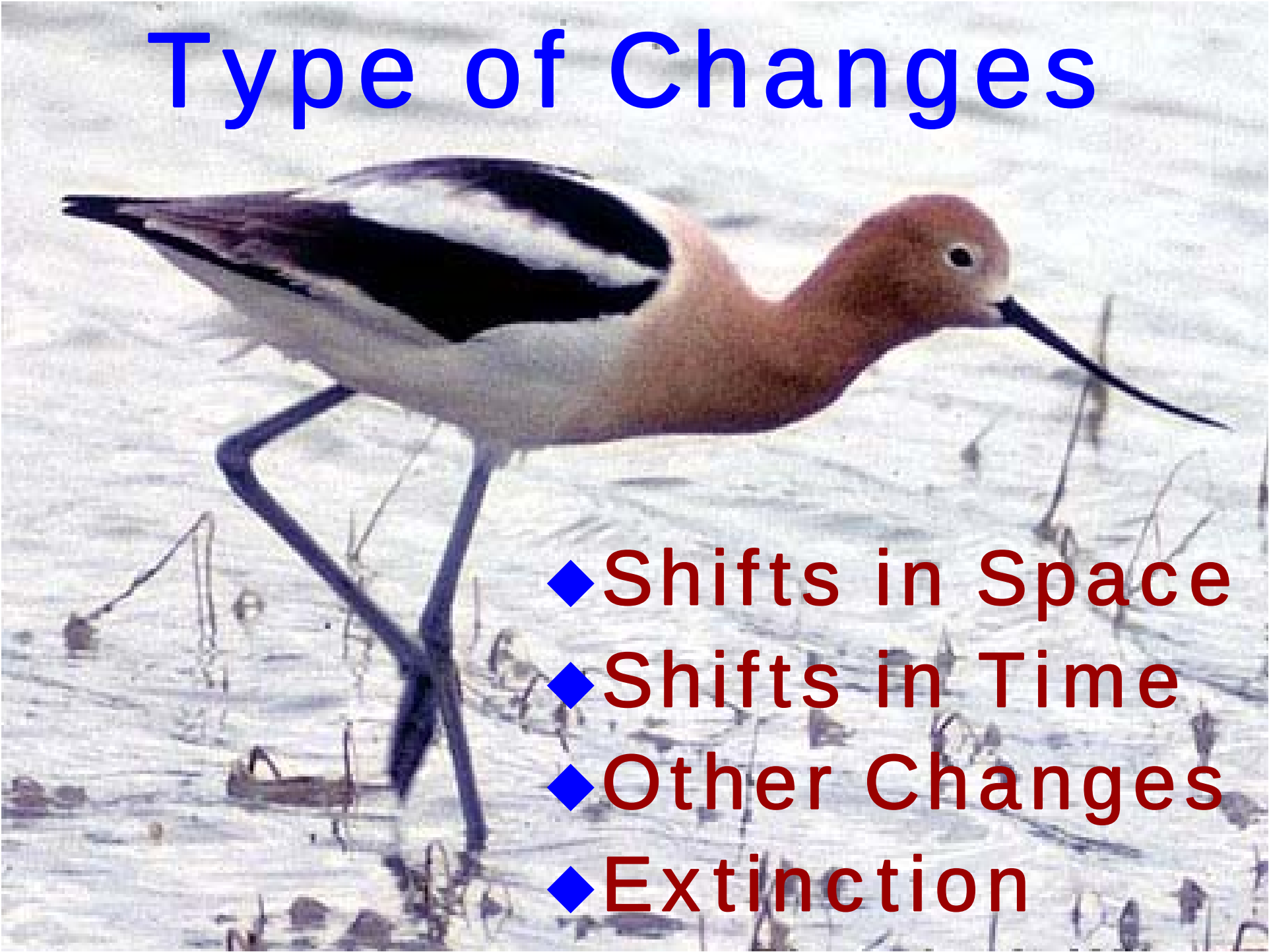


Reactions of Species to Rapid Warming



Type of Changes

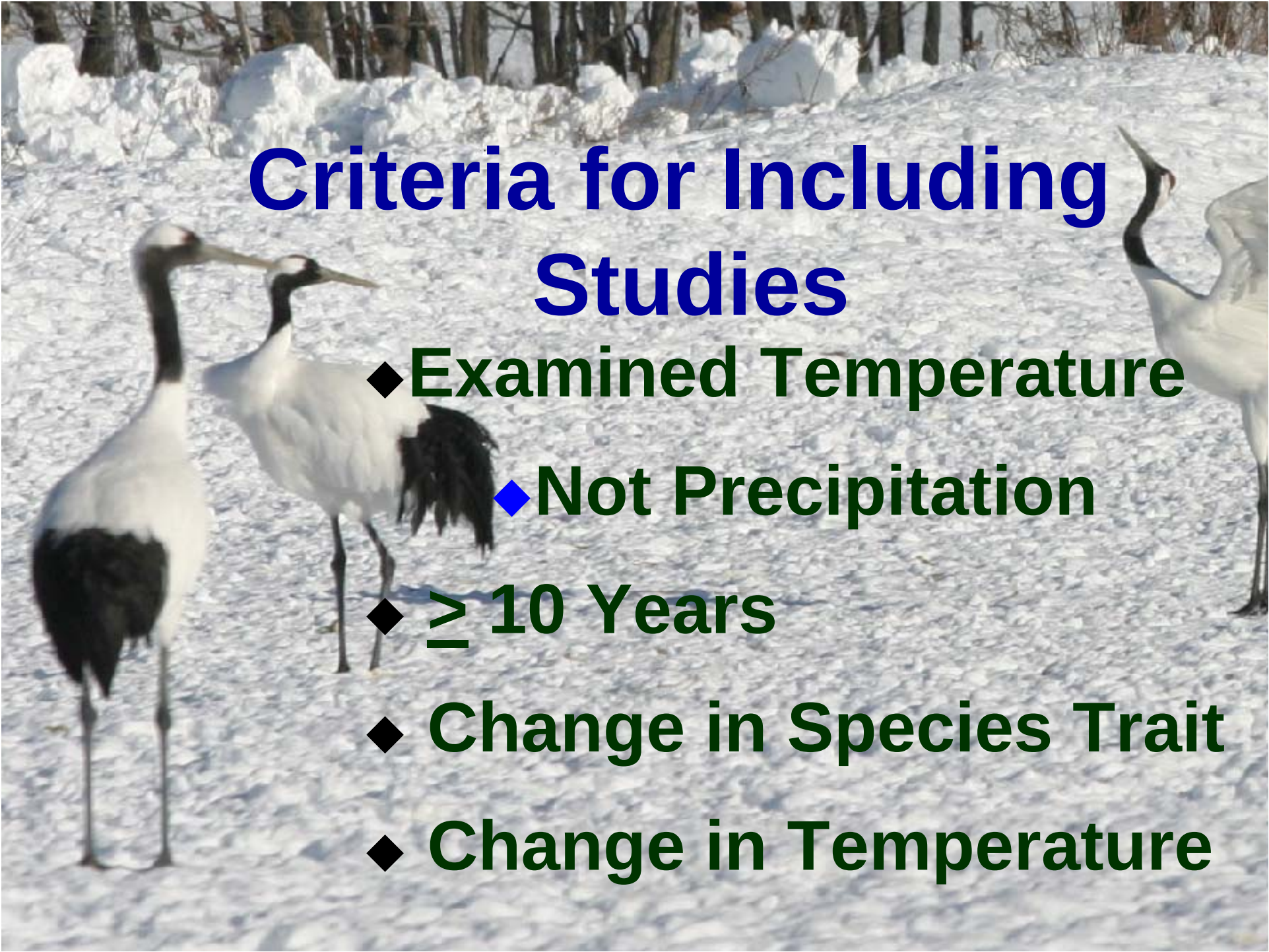
- 
- ◆ Shifts in Space
 - ◆ Shifts in Time
 - ◆ Other Changes
 - ◆ Extinction

Animal & Plant Studies

◆ ~3,000 Studies on Species
and Climate Change



◆ 143 Met Criteria

A photograph of three Japanese cranes (Grus japonensis) in a snowy field. Two cranes are in the foreground, facing each other, while a third is partially visible on the right. The background shows a line of bare trees under a clear sky.

Criteria for Including Studies

- ◆ Examined Temperature
- ◆ Not Precipitation
- ◆ ≥ 10 Years
- ◆ Change in Species Trait
- ◆ Change in Temperature

Locations of Studies

Arctic

North Sea

Asia Russia North America Europe

Pacific Ocean Central America

Australia New Zealand

Antarctic Ocean

Antarctica



Plant & Animal Species (1859+)

◆ Plants

- ◆ Grasses

- ◆ Forbs

- ◆ Trees

◆ Animals

- ◆ Invertebrates

- ◆ Fishes

- ◆ Amphibians

- ◆ Reptiles

- ◆ Birds

- ◆ Mammals



“

◆ 1859+ Species



◆ ~20% (386+) Showed No Change



**1473+
Changed**



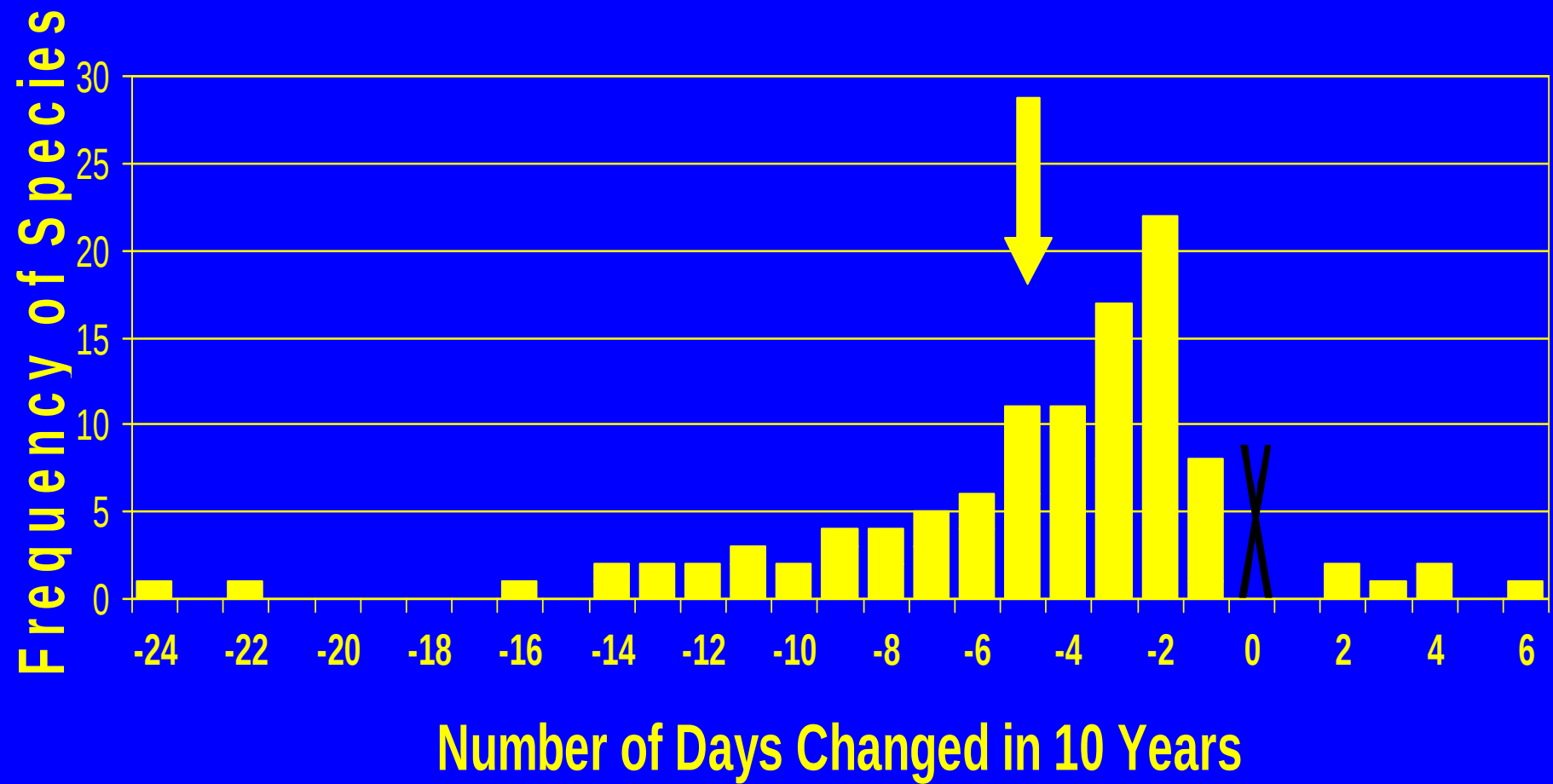
~20% (277+) Opposite

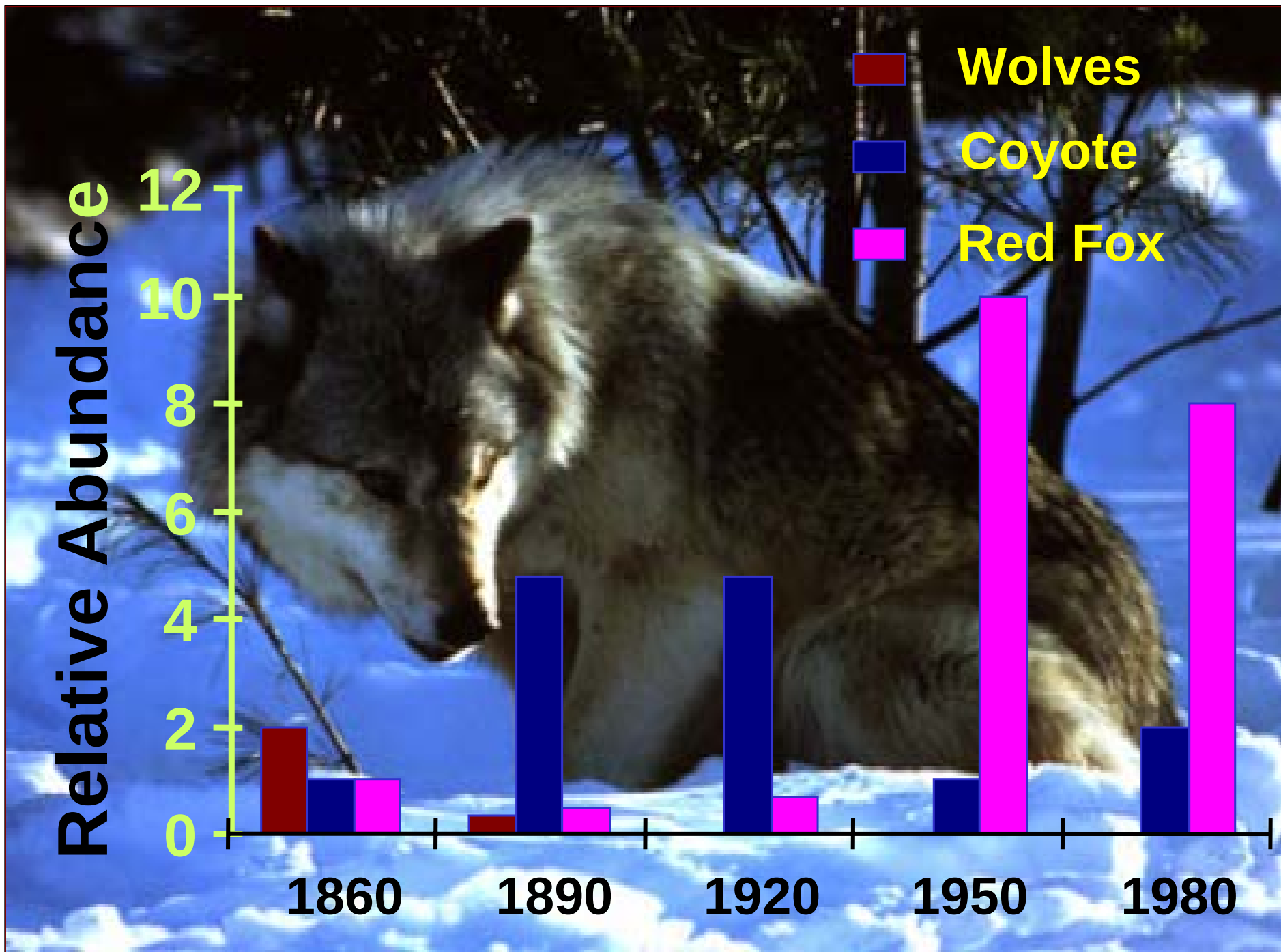
~80% (1196+) As Expected

Spring Phenology

61 Studies, 694+ Species

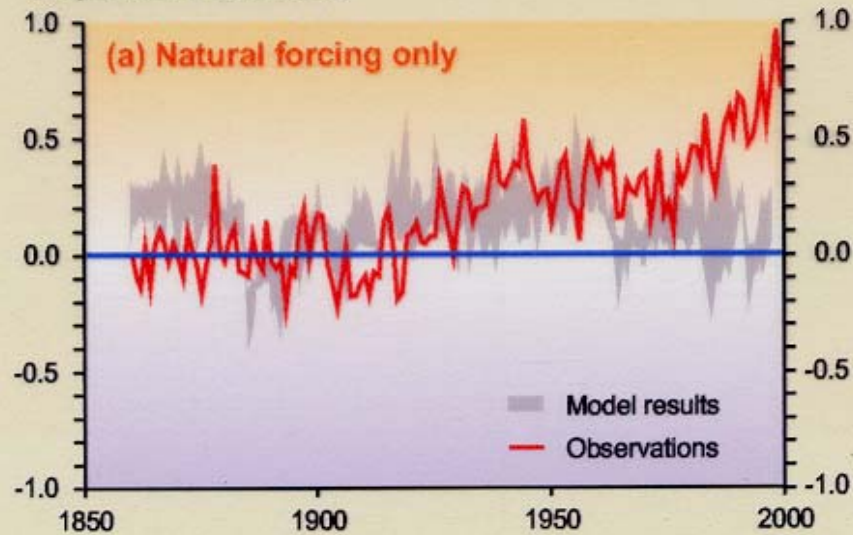
Wetshot



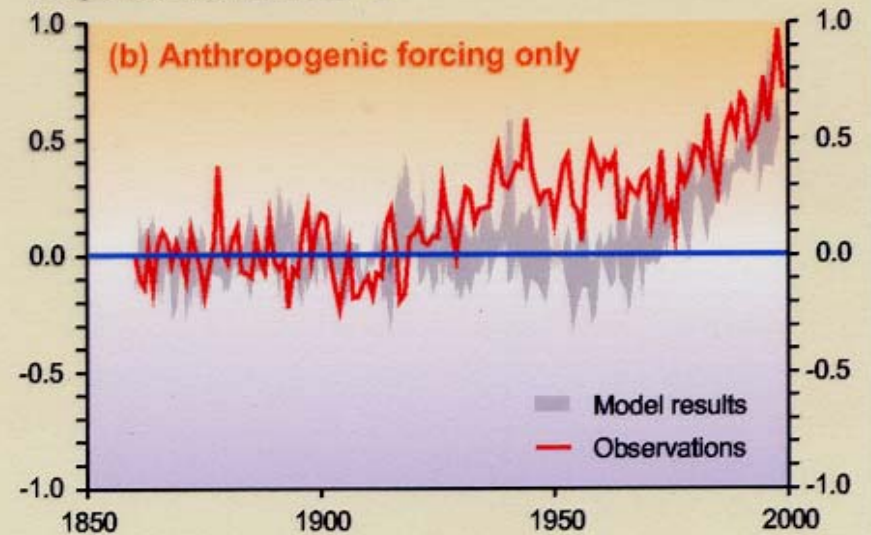


Comparison between model and observations of the temperature rise since 1860

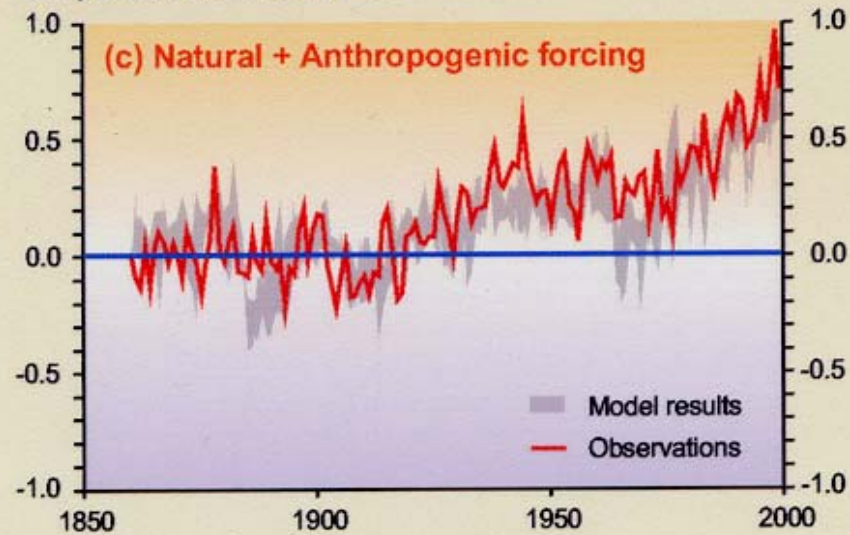
Temperature anomalies in

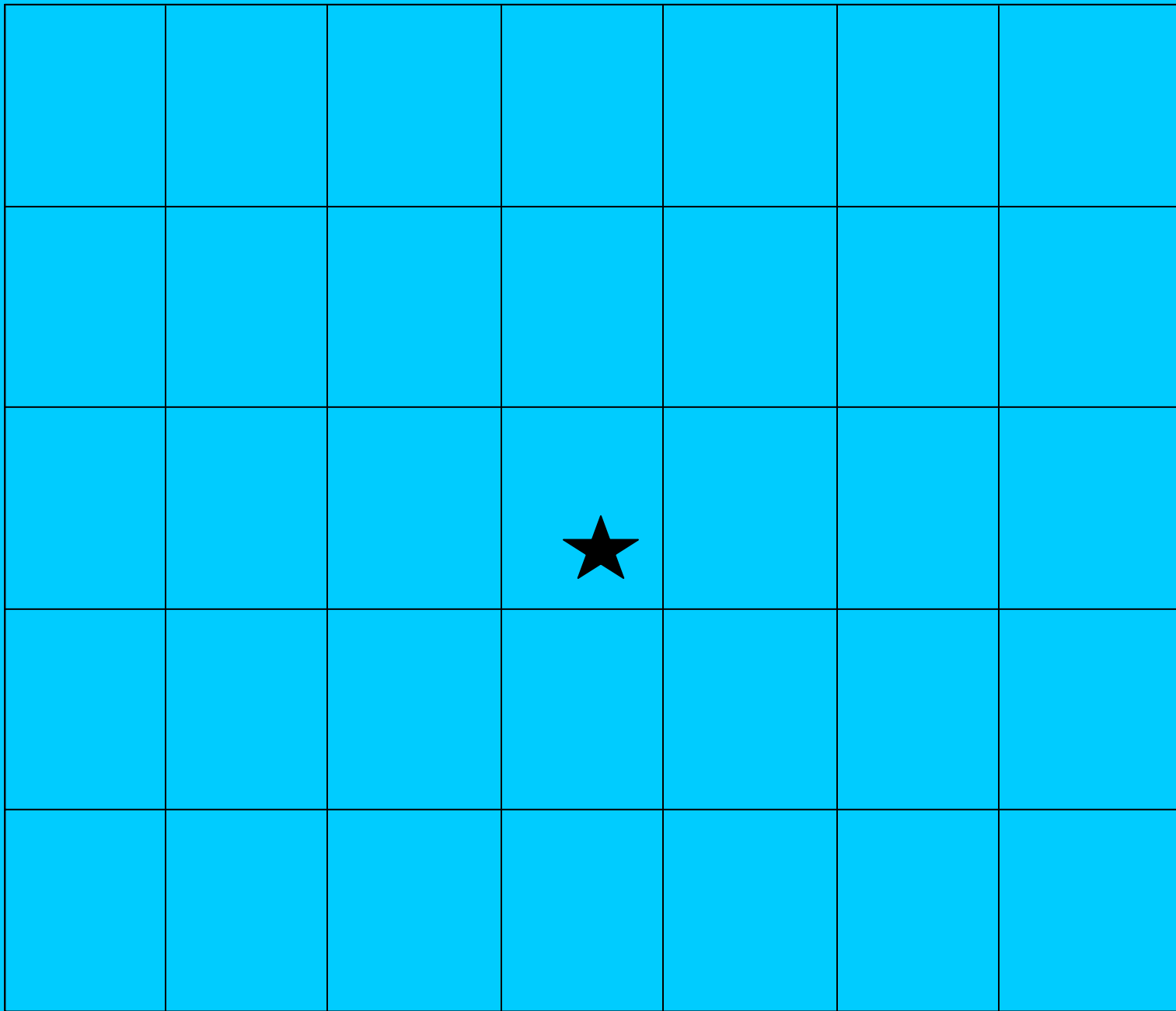


Temperature anomalies in C



Temperature anomalies in C





Joint Attribution

31 Years of Data (1969-99)

145 Species

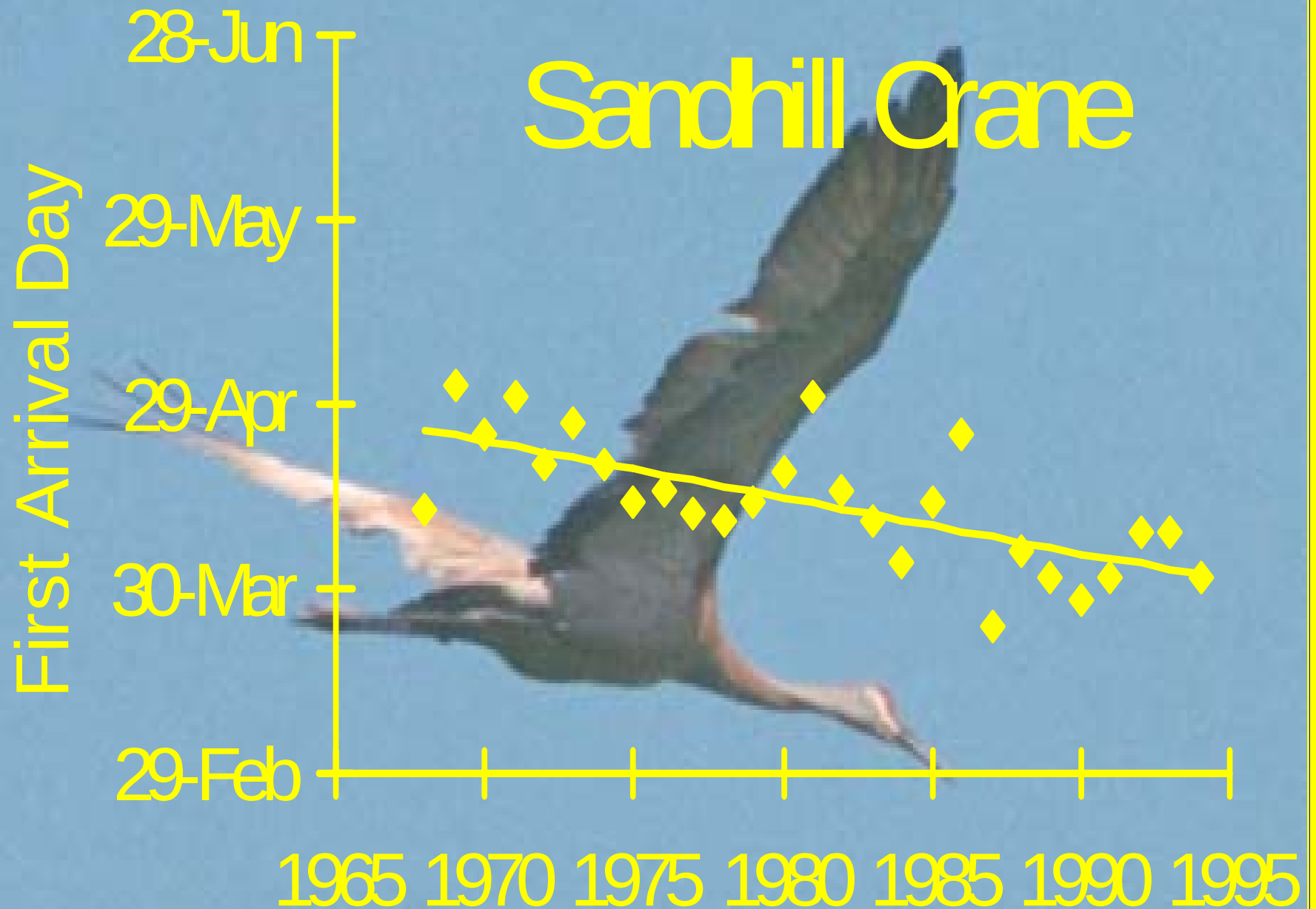
57% in North America

42 Study Sites

62% in Europe

41 GCM grid boxes

Sandhill Crane



Sandhill Crane

www.birdperch.com

